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(56) Documents Cited

**GB 2124739 A GB 2024367 A GB 1387576 A  
GB 0626779 A US 4957387 A US 4813810 A**

(58) Field of Search

**UK CL (Edition L) B7H HDJ HDT, F2U  
INT CL<sup>5</sup> B60K 17/22 17/24, F16D 1/10  
Online database: WPI**

(54) Snap-fit coupling for vehicle propellor shaft.

(57) The propellor shaft 22 is connected to a universal joint 28, 32, 34 by a snap-fit coupling for ease of assembly and disassembly. The universal joint may be between the propellor shaft 22 and the gearbox output shaft 20 or differential input shaft 24 or between two sections 26, 29 of the propellor shaft. The connection may include a clip 48 in a groove 46 of an externally-splined propellor shaft 24 which is received in a groove in an internally-splined sleeve 38 of the universal joint. Alternatively, the propellor shaft may be internally-splined (Fig.3).

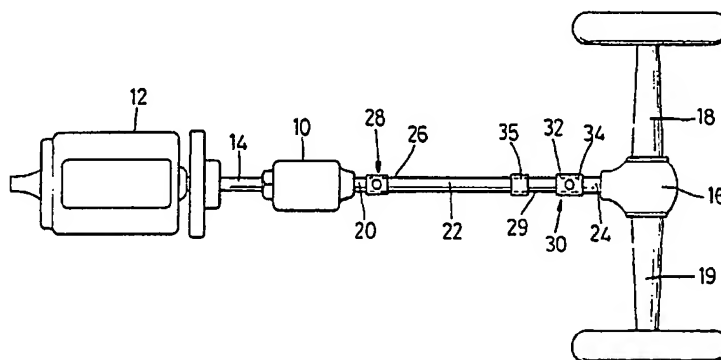


Fig. 1

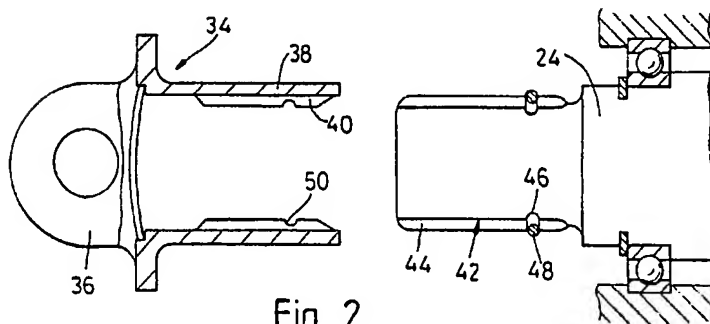


Fig. 2

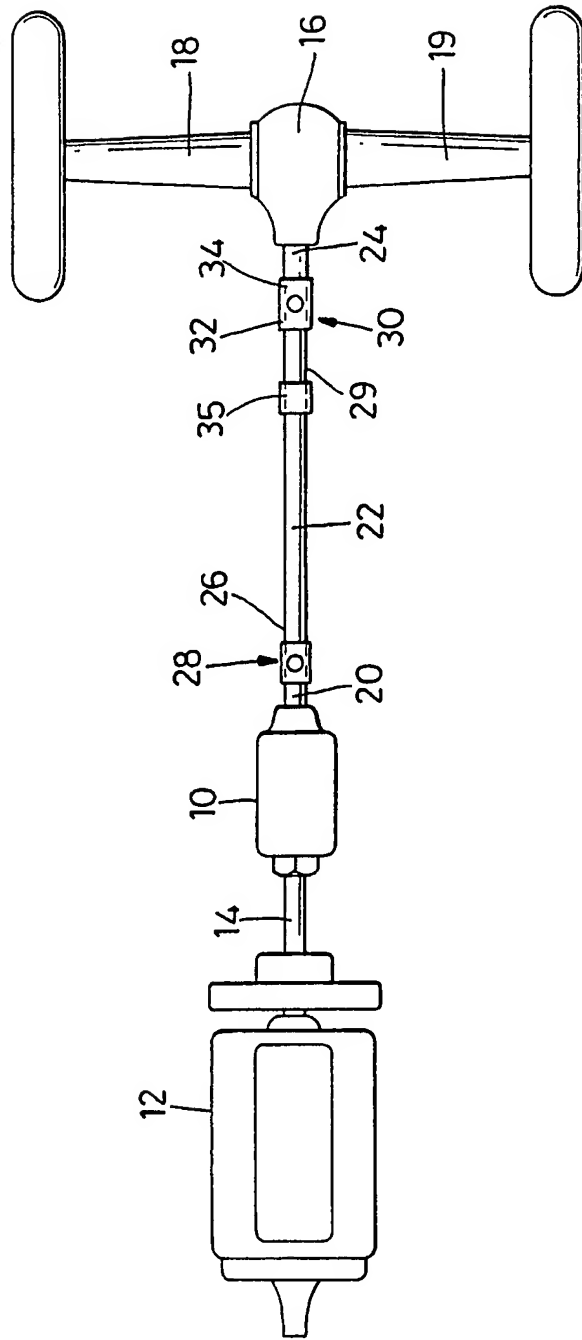


Fig. 1

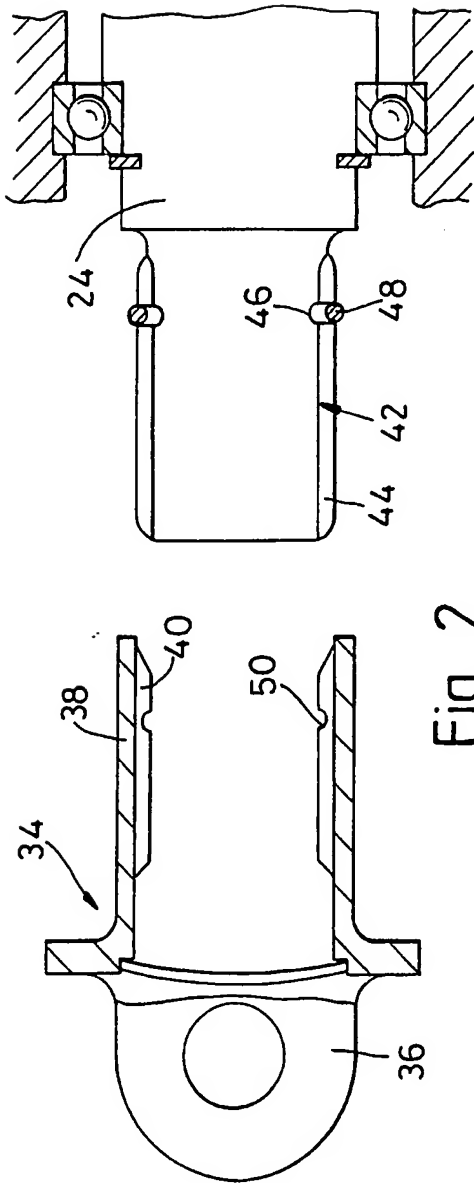


Fig. 2

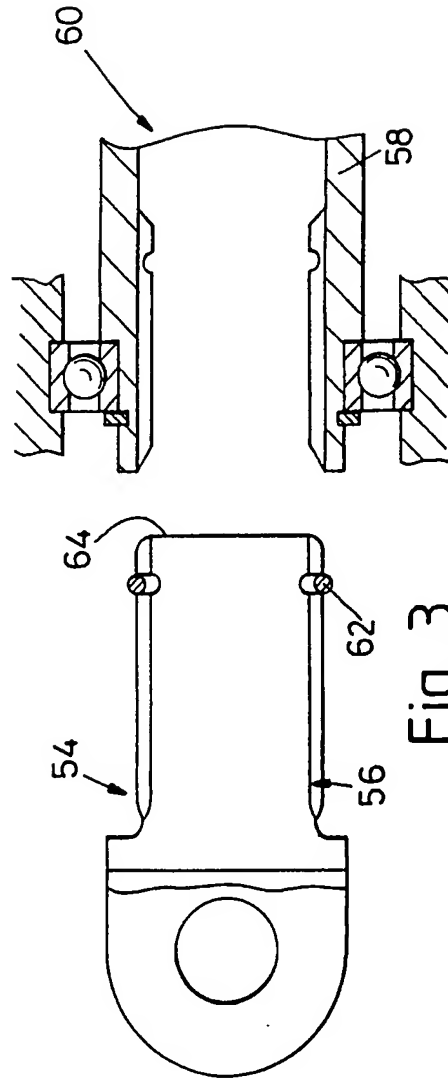


Fig. 3

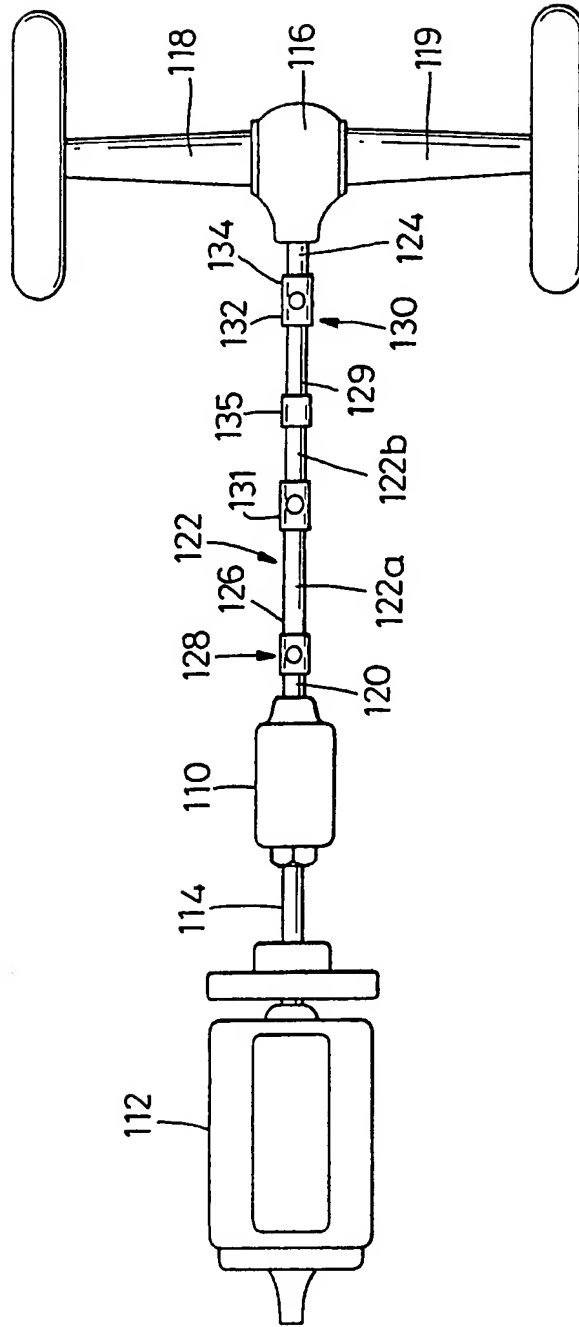


Fig. 4

A Transmission Assembly and a Propellor Shaft Therefor

The present invention relates to transmission assemblies for vehicles and in particular to improvements in propellor shafts in such assemblies.

Known propellor shafts are usually joined to gearbox output shafts and differential input shafts by universal joints. These joints are connected to at least one of the shafts by means of bolts passing through cooperating flanges on the joint and shaft. Also where the propellor shaft is in two or more sections these are joined together by similar bolted-on universal joints.

This arrangement is time consuming to assemble and awkward to remove for repair work.

Accordingly the present invention provides a transmission assembly for a vehicle, the assembly comprising a gearbox, a differential and propellor means for transmitting torque between the gearbox and the differential, the propellor means comprising two shaft members joined by universal joint means wherein one of the shaft members is connected to the joint means by a snap-fit connection.

Such an arrangement allows for quick, simple and cost effective assembly and dis-assembly.

One of the shaft members may comprise an input shaft of the differential, or the output shaft of the gearbox.

Alternatively the propellor means may comprise a propellor shaft made up of two or more sections connected by snap-fit connections, the propellor shaft being connected to the gearbox output shaft and differential input shaft.

Preferably said one shaft member and the joint means are in splined engagement.

Desirably resilient engaging means, for example a clip, is provided to produce said snap-fit connection.

Preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Figure 1 is a schematic diagram of a transmission assembly according to a first embodiment of the invention;

Figure 2 is a detailed section through a snap-fit connection in the assembly of Figure 1;

Figure 3 is a section through an alternative snap-fit connection to that shown in Figure 2; and

Figure 4 is a schematic diagram of a transmission assembly according to a second embodiment of the invention.

Referring to Figure 1, a transmission assembly for a vehicle according to the invention comprises a gearbox 10, which receives torque from an engine 12 via a gearbox input shaft 14, a differential 16 for transferring torque to each of a pair of drive shafts 18, 19, and propellor means comprising an output shaft 20 of the gearbox, a propellor shaft 22 and an input shaft 24 of the differential. The propellor shaft 22 is connected at its forward end 26 to the gearbox output shaft 20 by means of a first universal joint 28 and at its rear end 29 to the differential input shaft 24 by means of a second universal joint 30. The second universal joint comprises first and second joint members 32, 34 connected to the propellor shaft 22 and the differential input shaft 24 respectively, the joint members being coupled together in known manner to allow the required 'universal' movement between them. The first universal joint is constructed in the same way.

The propellor shaft 22 is made in two parts joined by a sliding joint 35 which allows for movement of the differential relative to the gearbox.

Figure 2 shows in detail the connection between the second joint member 34 and the differential input shaft 24. The second joint member 34 comprises a coupling portion 36 which forms part of the universal joint 30 and a sleeve portion 38 with internal splines 40 for connection to the differential input shaft 24. The differential input shaft 24 has a narrowed end portion 42 with external splines 44 designed to fit into the sleeve portion 38 of the joint member 34. A circumferential groove 46 is formed in the end portion 42 of the differential input shaft 24 near its base, passing through the splines 44. A retaining clip 48 rests in the groove 46, the groove being deep enough to allow the clip 48 to be compressed completely into it. The splines 40 on the joint member 34 have cut-outs 50 formed in them to cooperate with the clip 48 to hold the joint member 34 onto the end of the differential input shaft 24.

During assembly the propellor shaft is connected to the gearbox output shaft 20 and the differential input shaft 24 after the gearbox 10 and differential 16 have been

mounted on the vehicle. This is achieved by simply slicing the sleeve portion 38 of each joint member 34 over the respective splined shaft portion 42. The sliding joint 35 allows for the required longitudinal movement of the opposite ends of the propellor shaft 22. Figure 3 shows an alternative arrangement of the snap-fit coupling. The coupling is similar to that shown in Figure 2 except that the joint member 54 has an externally splined portion 56 which fits into an internally splined sleeve portion 58 on the end of the differential input shaft 60. Also the clip 62 is near the free end 64 of the externally splined portion 56.

Although in the embodiments described the propellor shaft is in one piece with a snap-fit connection between the propellor shaft and the differential input and gearbox output shafts, snap fit connections can also be used between the sections of a propellor shaft which is in more than one piece. Figure 4 shows such an arrangement, which is similar to the embodiment of Figure 1, with similar components indicated by the same reference numerals preceded by a 1, except that the propellor shaft 122 is in two sections 122a and 122b joined together by a universal joint 131. The connection between each of the shaft

sections 122a and 122b is a snap fit connection as shown in Figure 2. In this embodiment the connections to the gearbox output and differential input are snap-fit but they could be conventional bolted flanges.

Claims

1. A transmission assembly for a vehicle, the assembly comprising a gearbox, a differential and propellor means for transmitting torque between the gearbox and the differential, the propellor means comprising two shaft members joined by universal joint means wherein one of the shaft members is connected to the joint means by a snap-fit connection.
2. An assembly according to claim 1 wherein one of the shaft members comprises an input shaft of the differential.
3. An assembly according to claim 1 wherein one of the shaft members comprises an output shaft of the gearbox.
4. An assembly according to claim 1 wherein said one shaft member and the joint means are in splined engagement.

5. An assembly according to any foregoing claim wherein resilient engaging means is provided to produce said snap-fit connection.
6. An assembly according to claim 5 wherein the engaging means comprises a clip.
7. An assembly according to any foregoing claim wherein the connection includes a sleeve portion and a cooperating shaft portion each on one of said one shaft member and the joint means.
8. A propellor shaft for a vehicle the shaft comprising two shaft members joined by universal joint means wherein one of the shaft members is connected to the joint means by a snap-fit connection.
9. A propellor shaft according to claim 8 wherein one of the shaft members comprises an input shaft of a differential.
10. A propellor shaft according to claim 8 wherein one of the shaft members comprises an output shaft of a gearbox.

11. A propellor shaft according to any one of claims 8 to 10 wherein said one shaft member and the joint means are in splined engagement.
12. A propellor shaft according to any one of claims 8 to 11 wherein resilient engaging means is provided to produce said snap-fit connection.
13. A propellor shaft according to claim 12 wherein the engaging means comprises a clip.
14. A propellor shaft according to any one of claims 8 to 13 wherein the connection includes a sleeve portion and a cooperating shaft portion each on one of said one shaft member and the joint means.
15. An assembly substantially as described herein with reference to Figures 1 and 2 or Figure 3 or Figure 4 of the accompanying drawings.
16. A propellor shaft substantially as described herein with reference to Figures 1 and 2 or Figure 3 or Figure 4 of the accompanying drawings.

**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

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-10-

**Relevant Technical fields**

(i) UK Cl (Edition L ) B7H (HDT, HDJ); F2U

(ii) Int Cl (Edition 5 ) B60K 17/22, 17/24;  
F16D 1/10

**Search Examiner**

J L TWIN

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

**Date of Search**

9 JULY 1993

Documents considered relevant following a search in respect of claims 1-16

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2124739 A (TORRINGTON)	1,8
X	GB 2024367 A (MATSUI UJ)	1,8
X	GB 1387576 (GENERAL MOTORS)	1,8
X	GB 626779 (LOYNES)	1,8
X	US 4957387 (NASU)	1,8
X	US 4813810 (SUZUKI)	1,8

Category	Identity of document and relevant passages - 11 -	Relevant to claim(s)

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